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ABSTRACT

The Partnerships for Progress Bridge Program (a joint venture initiated by the University of Missouri St. Louis, local school systems, and private businesses) is described in this report. It is a key segment of the university's vision for the 21st century. The pilot program, implemented during the 1986-87 school year, concentrated on delivering a wide range of services designed to enhance the ability of secondary students to succeed beyond the secondary years. This multi-component effort offers services geared specifically to students with math and science interests. The components are: instructional enrichment; comprehensive counseling/advising; staff development; comprehensive motivation; and shared resources. Highlights of the pilot program include: 24 students in St. Louis city high schools received credit in the Advanced Credit Program; a summer enrichment program on-campus enrolled 30 high school juniors and seniors; and 29 ninth graders attended a 5-week summer math and science academy. Bridge Program components are as follows: shared resources (sponsored activities to reduce student anxiety over entering college); summer link (activities to introduce them to the college experience); and science/mathematics academy (activities for 120 tenth and eleventh grade students to help them develop motivation and self-confidence for science and mathematics study). Bridge Program activities for each semester are described, and the 1988/89 expanded program is discussed. (SM)

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PARTNERSHIPS FOR PROGRESS

BRIDGE PROGRAM

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AASCU/ERIC Model Programs Inventory Project

The AASCU/ERIC Model Programs Inventory is a two-year project seeking to establish and test a model system for collecting and disseminating information on model programs at AASCU-member institutions--375 of the public four-year colleges and universities in the United States.

The four objectives of the project are:

- To increase the information on model programs available to all institutions through the ERIC system
- To encourage the use of the ERIC system by AASCU institutions
- To improve AASCU's ability to know about, and share information on, activities at member institutions, and
- To test a model for collaboration with ERIC that other national organizations might adopt.

The AASCU/ERIC Model Programs Inventory Project is funded with a grant from the Fund for the Improvement of Postsecondary Education to the American Association of State Colleges and Universities, in collaboration with the ERIC Clearinghouse on Higher Education at The George Washington University.

Abstract

The Partnerships for Progress Bridge Program is a joint venture initiated by the University of Missouri-St. Louis with the cooperation of local school systems and private businesses. This cooperative effort reflects the significant commitment of these entities to improving educational opportunities for metropolitan St. Louis students.

The Bridge Program, a multi-component effort, provides comprehensive educational services. These services assist students in succeeding in secondary school and continuing their educations after high school graduation. Program services are geared specifically to students with mathematics and science interests and aptitudes. Core Bridge services include instruction and tutoring in mathematics sciences, computer science, study and communication skills.

BRIDGE PROGRAM

The Partnerships for Progress Bridge Program is a key segment of the University of Missouri-St. Louis Vision for the 21st Century. The Bridge Program is an appropriate title for the joint cooperation between the University of Missouri-St. Louis and St. Louis City and County school districts. The pilot program, implemented during the 1986-87 school year, concentrated on delivering a wide range of services designed to enhance the ability of secondary students to succeed beyond the secondary years.

Pilot Program

A prospectus of needs was developed jointly by the St. Louis City School District and the University based on the District's assessment of voids in its current delivery service. Five components were identified as the basis for a comprehensive program to meet the needs of the students:

I. Instructional Enrichment

II. Comprehensive Counseling/Advising

III. Staff Development

IV. Comprehensive Motivation

V. Shared Resources

Each one of the individual components became the task of a committee comprised of an equal number of faculty and staff from the University and the School District. Approximately 30 UM-St. Louis faculty members and 30 teachers and administrators from the St. Louis Public schools served on the five committees to plan and deliver the Bridge Program services. Committees were to research assigned concerns within their component and to develop opportunities to benefit the secondary students chosen to participate in the project. Co-chairs and members of the five committees were appointed on the basis of expertise and interest in the topic.

The Monsanto Fund provided a five-year grant to fund the Bridge Program, and they assigned a liaison position to a retired Monsanto executive. Additional rate dollars were allocated by the University of Missouri system from state funds. The UM-St. Louis Chancellor has continued to supply cost dollars each year to fund components of the program.

The St. Louis Public School Superintendent selected Vashon and Beaumont High Schools as the student groups for the pilot program. Beginning in winter 1987, programs and activities were conducted at both high schools and on the University of Missouri-St. Louis campus, as well as at selected off-campus sites. Some statistical highlights of the pilot program are listed below:

- 18 tutors and 12 university student mentors served to broaden high school students' motivation and academic competencies by providing on-site support to high school teachers.
- 24 students in St. Louis city high schools received credit in the Advanced Credit Program.
- 600 high school students gained enrichment experiences by attending 11 university concerts, athletic events, health fairs, festivals and other planned activities.
- A summer enrichment program on-campus enrolled 30 high school juniors and seniors.
- Approximately 29 ninth graders attended a five-week summer Math and Science Academy at the UM-St. Louis campus.
- The St. Louis Agency on Training and Employment funded summer academic workshops and employment for 56 students.
- ACT/SAT preparation workshops benefited 62 Vashon and Beaumont students.

Established Bridge Program

The Bridge Program provides critical opportunities for study, counseling, and career exploration for high school students in the St. Louis area. The Program provides academic involvements on several levels, from confidence building activities that use science and mathematics knowledge to explain facts of daily life, to advanced rigorous studies in interdisciplinary science and mathematics areas. This approach maximizes the availability of services to educationally disadvantaged students, while affording highest ability/achieving students important opportunities for accelerated study.

The focal period of program activity is the summer when selected students participate in campus-based study, counseling and career exploration activities. The summer program is held for six weeks (June-July). Academic year tutoring, workshops and other academic support activities are conducted for target students in area schools. These activities reinforce and expand knowledge and skills learned during the summer. School year follow-up assists students in utilizing skills in the classroom and promotes academic achievement. This contact throughout the year sustains students' interests and allows program staff opportunities for needed, on-going counseling and mentoring involvements. These involvements are critical for target students from disadvantaged backgrounds who frequently lack guidance from home to pursue necessary career training.

Following are descriptions of the Bridge components.

I. Shared Resources

Through Shared Resources, the Bridge Program delivers a wide range of involvements for area students. Through sponsored activities, the program seeks to reduce students' anxieties about entering the college environment. Guided tours of campus facilities, information sessions on the admissions process and various other activities provide opportunities for pre-college students to interact with university students, faculty and staff in a number of settings. A schedule of typical Shared Resources activities follows:

September-May	By arrangement of area schools	Tours of the Campus -Admissions and Financial Aid Presentations
October	Target Schools	Library Skills Workshops

November	Target Schools	Math Survival Skills Workshops
December	Target Schools	Holiday Concert
February	Target Schools (8th-9th grades)	Science Can Be Fun Workshop
March	Target Schools (10th grade)	Computer Skills Workshop
	(9th-12th grades)	Health Fair
April	Target Schools (10th-12th grades)	Careers in Science Technology Fair

II. Summer Link

Activities are offered to 60 rising and graduating seniors. These activities include enrollment in college level English, sociology, political science, mathematics and science courses. Students also participate in a number of counseling activities and skills development workshops that aid them in securing financial aid and improving their SAT/ACT scores. These students also work at jobs arranged by the University with cooperating employers. Summer Link courses and activities are structured to provide a "guided for success" introduction to the college experience. The Link student's day is divided into three important parts: academic classes and tutoring, 9:30-11:30 a.m.; enrichment and college planning, 11:30-12:30 p.m.; and work at program arranged employment, 2:00-5:00 p.m. A typical schedule of enrichment and college planning activities follows:

June-July

Weeks 1-2	Reading and Study Skills Workshops
Week 2	Library Tour
Week 3	Placement Exams
Week 4	Workshops: "Reducing Test Anxiety"
Week 5	Workshops: "Goal Setting"
Week 6	Workshops: "Career Decisions"
Week 7	Workshops: "Financial Aid and College Planning"

To participate in this level of the program, students must apply for admission to the University of Missouri-St. Louis. Qualified students are enrolled and receive University credit for successful completion of courses. Students do not pay fees or tuition for Summer Link involvement.

III. Science-Mathematics Academy

Activities are provided for 120 selected rising tenth and eleventh grade students. The activities include participation in creative classroom and laboratory experiences in algebra, geometry, trigonometry, biology, chemistry, physics, and computer science. Students are involved in small group counseling sessions and interactions with mentors. These contacts assist students in setting goals and taking personal responsibility for

their educational and career achievements. Field trips and related career investigatory activities provide exposure to work environments where science and math skills are used in daily operations. Academy courses and activities are designed to assist students in developing motivation and self-confidence for science and mathematics study. Academy activities are conducted during the summer for a five week period. Academic classes and other activities are scheduled Monday through Thursday, 9:00 a.m.-2:00 p.m.

Tenth Grade Level

At the tenth grade level, science and mathematics skills are taught in the process of investigating problems and facts of daily living. A field trip coincides with each week's study. Following is an outline of typical Academy activities:

June-July

Week 1 Trip -- Archaeology Dig -- Bridgeton

Physics: Study of projectile motion - arrowheads.

Math: Study of theories of triangles and squares - baseball diamond and other courts.
Biology: Study of food sources - beef jerky.
Chemistry: Study of pigments made from plants.

Week 2 Trip - Visit to Super Market

Physics: Study of electronic cash register.
Math: Study of universal products codes.
Biology: Study of the use of acids in preservation - make sauerkraut.
Chemistry: Study of organic compounds, make an ether from acid and alcohol.

Week 3 Trip - Monsanto, Inc. - Heredity

Physics: Space and Growing things
Math: Probability and Predicting Outcomes
Biology: Genetic Tree
Chemistry: DNA

Week 4 Trip - Bridgeton Police Station - Criminology

Physics: Voice Printing
Math: Problem-solving
Biology: Test for blood on knife - getting information from bones
Chemistry: Fingerprinting

Week 5 Trip - Optometry School - Human Health

Physics:
Math: Statistics
Biology: Blood pressure, heart rates, EKG
Chemistry: PH tests

Eleventh Grade Level

At the eleventh grade level, Academy activities, provide more detailed study of selected topics. Field trips and laboratory experiences are included in each week's activities. Course topics and involvements indicated below are typical of curriculum planned for this level:

June-July

Week 1

Biology: Le' Tooth!

A study of teeth from man to shrew, illustrating how form follows function. Students will discover the relationship between diet and tooth structure and observe a variety of animal skulls and form hypotheses as to their diets.

Chemistry: Is it Real?

A study of polymerization reactions and the chemistry of plastics and polymers. Students will make nylon, bakalite and other plastics, also students will make silly putty.

Physics: Introduction to Experimental Error and Data Analysis

Laboratory investigations involving taking measurements of physical quantities and the process of making computations with such information always involves some uncertainty. The student will examine and operate several types of physical measuring instruments and investigate how their proper operation contributes to measurement uncertainty. Introduction to computer assisted graphing of laboratory data will be made using Apple IIe Computers.

Field Trip: Tyson Research Center

Week 2

Biology: Plant Misbehaviors

Study of plant behaviors and tropism, students will setup behavior experiments subjecting plants to unusual G-forces and predicting their behavior in space. In addition, the students will analyze the wavelengths of light needed for photosyntheses and the different pigments in green plants.

Chemistry: The creation of life!

Students will attempt to create life in the lab using models of living systems. The students will analyze amino acids, the basic building blocks of life, using chromotography. They will view film strips of the work of Miller and Fox who pioneered the field of Exobiology.

Physics: An Introduction to The Scientific Method

In order to illustrate the concept of the "scientific method" a theoretical expression or equation that describes the behavior of a simple pendulum will be given. The students will test the validity of the equation with experimental results using electronic timing equipment. Graphic analysis will be conducted by use of the Apple IIe Computer.

Field Trip: Monsanto Farm

Week 3

Biology: Have a Heart!

A study of the most powerful human organ; the heart. Students will observe a living frog heart and take EKGs and electromyograms. They will note the effects of various drugs and neurotransmitters on the heart. In addition, the students will perform a dissection of a pig heart and study the mechanics the circulation.

Chemistry: Keeping it Clean.

This is a study of soap, detergents, and bleaches. The students will make soap, detergent, and several types of bleach. They will study the chemistry of stain removal and investigate color-chemistry.

Physics: The Study of Motion

Several of Newton's most prominent theories on motion will be discussed. Demonstrations including the use of Air Tracks, and Strobe Photography using Poloroid cameras will be made in order to introduce the student to methods for motion studies.

Field Trip: UM-St. Louis, School of Nursing

Week 4

Biology: The Speed of Spit!

Human digestion and enzyme action is studied this week, using actual enzymes present in the student's own saliva. They will investigate the digestion of food and enzyme activity. In addition the digestion of starch and protein will be observed.

Chemistry: Weird Reactions!

This is a study of the chemistry of catalysts using strange and bizarre reactions, giant snakes, fireworks, (minor) explosions and various timed color changes.

Field Trip: McDonnell Douglas

Physics: Wave Motion

The behavior of waves in different mediums provides a model for the study of several properties of matter and the transmission of energy. The student will study wave motion in various forms, as well as the mathematical treatment of wave components. This will be achieved with simple experiments using water, cords of string, and room air. The forms of mechanical, and electrical conveyance of energy will be included.

Week 5

Biology: Chewing Gum, Popcorn and Soybeans?

More food science: The science of food preparation, cooking and vitamin studies. Students will investigate protein denaturation, gluten content in wheat, expansion reactions in gourmet popcorn, the uses of the soybean, and the various cures for scurvy.

Chemistry: Food Facts!

What's in the munchies you chow down on. Students will analyze the fat, protein and sugar content of the food they eat. What's left after you remove salt, fat and sugar?

Field Trip: Food Processing Center? Slaughter House? Bakery? Tums factory? Sprout Factory? Produce Row?

Physics: Optics - Spherical Mirrors and Lenses

Mirrors and lenses are familiar objects that are used daily. The common mirror is a plane mirror, however spherical mirrors have many common applications. The student will investigate the properties of spherical mirrors and lenses with several demonstrations and experiments.

Eleventh Grade Math Project: "An Excursion into Infinity."

Purpose: To introduce students to the abstract concept of infinity; to demonstrate to students some mathematical concepts which involve higher level thinking skills.

Description: The concept of infinity is generally not introduced to students until their first year of calculus. However, infinity is an idea which can be explored outside of the context of a calculus course. The majority of these eleventh grade students will have completed one year of algebra and one year of Euclidean geometry, which will provide sufficient background for discussion of the following topics over the five week period:

1. Infinite continued fractions,
2. the golden ratio,
3. limits of functions,
4. irrational numbers,
5. infinite series, and
6. non-euclidean geometry.

Students would not be expected to become proficient in their understanding of all of these topics. However, exposure to these topics will help students to see that mathematics goes beyond the formulas and methods to which they have previously have been exposed. Ultimately, it would be hoped that familiarity with the abstract concept infinity would encourage students to continue their study of mathematics to calculus and beyond.

BRIDGE PROGRAM ACTIVITIES, 1987-88

Fall 1987 Semester

Advance Credit Courses

The English, Biology and Political Science courses were taught for two semesters, and students who successfully completed a course earned three credit hours. Those taking History courses earned three credit hours each semester. Registrations were as follows:

		Beaumont	Vashon	Center for Mgmt, Law, Public Policy	
English Literature 012		38	20	-	
American Literature 017		36	22	-	
American History 003		29	22	-	
Western Civilization 031		20	13	-	
Biology 001		14	15	-	
Political Science		-	-	23	
		137	92	23	[T=252]
Multiple course registrations:	Two	49	23		
	Three	8	1		

Tutors

Twelve tutors were placed; two worked at both Beaumont and Vashon. It was rather easy to recruit UM-St. Louis students to work in Beaumont's all-day computer lab and after-school tutorial lab (2:15-4:00 p.m.). We found it more difficult to provide adequate coverage to Vashon for two reasons: fewer tutor applicants were available during morning hours, and the class schedule contained gaps for which we could not pay tutors (e.g., Algebra at periods 1, 4, 6; Physics at periods 3 and 5). Few tutors are willing to travel and work only one hour.

Tutors in the following subjects were assigned to Beaumont: Biology, Chemistry, Computer Science, English, Mathematics, and Physics.

Vashon had tutors in Biology, English, Mathematics, and Spanish.

A tutor was assigned to the Political Science class at the Center for Law, Management and Public Policy.

Saturday tutoring on campus

Students who attended the Summer Science and Math Academy were invited to use the Math Lab in the Center for Academic Development (CAD) on Saturday mornings.

Shared Resources

The Shared Resources Committee is the only Bridge coordinating committee which continues to function as it did during the pilot year. Several activities were arranged:

Eight journalism seminars conducted by the St. Louis Post-Dispatch taught media production techniques to UM-St. Louis and high school students. Students were also treated to brunch at the Press Club. Approximately 25 SLPS students participated.

SLPS students attended the women's volleyball tournament at UM-St. Louis in October (ca. 20).

SLPS invited UM-St. Louis music faculty and students to a program in October featuring the District Jazz Ensemble and the Howard University jazz group.

SLPS students (40) attended a Madrigal Concert and mini-lecture, and had lunch at UM-St. Louis in December.

ACT/SAT preparation workshops were conducted by UM-St. Louis personnel at Vashon and Beaumont.

Winter 1988 Semester

Expansion to Wellston School District

Beginning this semester, Eskridge High School in Wellston began to receive Bridge services. Tutors were placed, and other services were offered. No advance credit courses were started.

Advance Credit Courses

As noted above, most courses started in Fall 1987 continued.

	American History 003	Western Civilization 031
Beaumont	27	14
Vashon	17	13

Advance credit classes are expected to visit the UM-St. Louis campus once during the year. All advance credit Political Science classes visited during the Fall Semester, and had a full program of activities. The Bridge Program Coordinator met with the class from the Center for Management, Law and Public Policy. Other classes visited the campus during the Winter Semester.

Tutors

The following tutor assignments were made:

Beaumont: Algebra, Biology, Chemistry, Computer Science, English, History, Mathematics, Physics

Vashon: Algebra, Biology, History, Mathematics

Eskridge: English, Chemistry, Computers/Mathematics

A day-long tutor training session was held.

Saturday programs on campus

Students received an invitation to use the Math Lab in CAD and a schedule listing Saturdays on which the lab was open.

Three sessions will be held to acquaint Bridge students with college financial aid planning and to provide contact sessions with UM-St. Louis mentors.

Shared Resources

A student assistant was employed in January 1988 to help coordinate arrangements for Shared Resources activities.

Students from Beaumont and Vashon toured the UM-St. Louis library.

At least four ACT/SAT/PSAT preparation workshops were held at Beaumont and Vashon.

Students were invited to the UM-St. Louis Science Symposium in March.

Professional storytellers performed at Beaumont and Vashon during the International Storytellers Convention in May.

Students were recruited for the Women's Science/Math Symposium in March. Shared Resources paid for some goggles. SLPS provided transportation.

In April, health fairs were conducted at Beaumont and Vashon.

Other activities and curriculum enrichments were considered: basketball games, possible field visits to the astronomy observatory and Missouri Botanical Gardens; integration of drug education into SLPS curriculum, Jazz Ensemble performance.

The SLPS administration approved a UM-St. Louis request to lend computers and printers for the Gateway Writing Project course this summer.

Summer 1988

Math and Science Academies

Students from Beaumont, Metro, Vashon, Eskridge, Normandy, University City and the Archdiocese high schools participated in two summer math and science academies, one for rising sophomores and one for rising juniors. These five-week programs were offered in the morning. Subjects were Biology, Chemistry, Physics, Computer Science and Mathematics, reinforced with weekly field trips.

All students who participated in the first summer's academy for rising sophomores were invited to enroll in the second level academy, which offered an advanced curriculum in the same subjects.

Both academies were taught by the same set of teachers. The Biology and Mathematics teachers were UM-St. Louis faculty members; other subjects were taught by high school teachers, approved by the relevant UM-St. Louis departments.

UM-St. Louis provided free tuition and bus passes. School district and donor corporation representatives were invited to pre- and post-academy receptions for participants and their parents.

Thirty-two students enrolled in the Academy.

College Credit Courses

Two courses were offered to rising seniors and June graduates, with students from the schools named above having priority for the 30 places in each class. Students earned three college credit hours. SLPS students also received high school credit for Psychology.

> General Psychology. A broad introductory survey of the general principles of human behavior.
>
> Anthropology. A course developed for the Bridge Program by an experienced African-American anthropologist, entitled "Facing our Future: Race in Self, Society and Science."

Each class had a supplemental instructor who helped students to study after two class sessions each week. On the other two days, students participated in enrichment seminars on study and test-taking skills, college and career planning, and other topics.

Students received free tuition and books. There is an employment component to this program and the retired Monsanto executive solicited afternoon employment opportunities from corporations. Students who had jobs received free bus passes and lunch vouchers only for the first two weeks of the program. Students with no employment received free passes and lunch vouchers throughout the session.

1988-89

Expanded Program

Based on the pilot and first-year program between the University and the St. Louis City schools, the University formed additional partnerships with county districts--Normandy, Wellston, and University City. As part of the program expansion, the Bridge services now include, as well as the original components, a Saturday Academy, Science-Mathematics Clubs, and parental involvement.

The Saturday Academy for College Skills Development began with over 40 ninth and tenth graders who also participate in the Bridge Science-Mathematics Clubs or who attended a previous summer Math and Science Academy. Academy students participate in a variety of personal and academic development activities:

1. Personal Development workshops and activities including career exploration and communications skills development. These workshops are developed to assist students in understanding their responsibility for setting goals and developing skills to assure their success in reaching their goals.

2. ACT/SAT/Study Skills workshops with computer assisted tutoring for math and verbal sections of the two major college entrance examinations. Study skills sessions guide students in getting organized to obtain maximum benefit from study. Students also learn and practice effective note taking and reading techniques.

3. Guided recreation experiences. These promote interpersonal skills development, team and group cohesiveness and physical fitness.

Activities are planned from 9 a.m. to 1:30 p.m. two Saturdays a month. The day begins with a counseling session run by a UM-St. Louis Bridge tutor. Morning and afternoon snacks are provided. The entire program concludes with a leadership retreat.

Goals of the Saturday Program

Content for the Saturday Program has been developed to address obstacles that prevent minority students from pursuing math based fields of study. These obstacles were identified by the Mathematics and Science Education Network (MSEN), University of North Carolina at Chapel Hill. These obstacles are also identified in studies on minority students' achievement, college enrollment and retention:

1. To improve oral and written communications skills; (Personal Presentation Skills)

2. To improve study and test taking skills; (Computer Labs - Math/Vocabulary Development)

3. To provide information about careers in math based fields of study; (Career Planning Sessions; Leadership Retreat)

4. To provide positive role models; (tutors and recreation leaders)

5. To provide counseling about high school course requirements for math based fields of study. (Career Planning Sessions)

6. To promote interaction with representatives from industry, professional societies and universities. (Leadership Retreat; all Saturday Programs)

(See also Contextual Factors in Education: Improving Science and Mathematics Education for Minorities and Women, Wisconsin Center for Education Research, 1987.; Equity and Excellence: Compatible Goals for Education in the Sciences, American Association for the Advancement of Science, 1985; "Social Class, Academic Ability, and College Quality" by J. Karabel and A. Astin, Social Forces, 1975; "Action Programs for Academically Underprepared Students" by J. Kaufman from a Catalog of Successful Practices - How to Succeed with Academically Underprepared Students, the ACT National Center for the Advancement of Educational Practices, 1982)

The Science-Mathematics Clubs have been formed in each of the target schools. Teachers who volunteered to be club leaders received training during fall, 1988 and the program began in January 1989. The teachers receive a small stipend to offer enrichment activities to ninth graders in their schools. Business volunteers also participate in club activities. In addition to being involved in the Saturday Academy, students from the clubs will also participate in the summer Math and Science Academy.

Parental Involvement is being stressed in conjunction with the new components. Parents attend orientation and agree to a four-year commitment to the Bridge Program before students are allowed to participate in any of the components. They sign a four-year agreement that students will join the Science-Mathematics Clubs, attend the Saturday Academy and one of the summer programs, participate in field trips, register for high school, college track courses in math and science. Parents also agree to respond to questionnaires and participate in research related to the program.